The Voluntary Nutrient Reduction Program: Collaborating to Restore Water Quality in the Clark Fork

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Introduction

The Clark Fork River Voluntary Nutrient Reduction Program (VNRP) is a landmark 1998 agreement to reduce nutrient pollution in the upper and middle Clark Fork River. The agreement allocates nutrient discharge into the river between three municipal wastewater treatment plants (Butte, Deer Lodge, and Missoula), one industrial discharger (Smurfit-Stone) and Missoula County (responsible for septic systems).

Excess nutrients—nitrogen and phosphorus--and the associated algae blooms which can disrupt aquatic life, irrigation, and recreation in the river, are perhaps the most widespread water quality problem in the basin. The VNRP's goal is to eliminate the excessively high levels of algae, and restore the water quality of a 200-mile reach of the river from Warm Springs Ponds to the Flathead confluence. The signatories allocated reduced nutrient loads among themselves through a collaborative process. Each discharger who signed the VNRP then agreed to make the major investments required to achieve this goal.

A monitoring plan for algae and nutrients has been put in place for the entire basin by the Tri-State Water Quality Council (the Council), the entity which facilitated the VNRP negotiations. Progress in improving river water quality will be formally evaluated every three years by the VNRP subcommittee of the Council, which includes a Montana DEQ representative.

The VNRP was accepted by the State of Montana and the Environmental Protection Agency as a water quality improvement plan, equivalent to a Total Maximum Daily Load (TMDL) under the Clean Water Act. It has provisions which allow the signatories until 2008 to meet specific numerical targets for nutrients and algae in the river. Although only the principal dischargers were involved in the initial negotiation, they are working to obtain the voluntary cooperation of other discharge permit holders, watershed groups and conservation districts to reduce nutrient pollution in the river and its tributaries.

During the first year and one-half since the agreement was signed, the VNRP signatories have made substantial progress in implementing their goals. Yet, as the program's implementation moves into full swing, several scientific and policy questions remain. Are the water quality targets attainable through the efforts of the signatories alone? Will population growth in the basin endanger the VNRP? How will the State manage other MPDES permits for nutrients? Will other projects, such as Superfund or the Natural Resource Damage Program positively affect the VNRP's goals? Does the public understand nutrient pollution and its effects, and are they willing to make further sacrifices to control it?

Progress on Implementing the VNRP

The VNRP signatories have committed themselves to specific actions to reduce the nutrient pollution in the Clark Fork during the summer season when algae blooms are a problem.

Since the agreement was signed, the following actions have gotten underway:

*The **City of Missoula** has signed a contract with a Montana engineering firm to design a $14 million expansion to its existing wastewater treatment plant, and improve the treatment of the wastewater with a new process called biological nutrient removal. This expansion not only helps the City meet its commitments to VNRP, but will also allow for the growth of Missoula, the connection of new areas to sewer, and the protection of groundwater which supplies local drinking water.

*The **City of Deer Lodge**, working with the National Park Service's Grant-Kohrs Ranch, last year installed a land application system for its treated sewage effluent, and the Ranch will use that effluent to irrigate some of its hayfields. Land application allows the excess nutrients in the wastewater to be absorbed by crops instead of causing algae blooms (locally known as "slime and moss") after being dumped in the river.

Smurfit-Stone Corporation's paper mill has been storing all pulp mill effluent in its ponds during summer low flows to avoid discharging to the river during algae season, and is searching for other ways to reduce nutrient discharge.

The **City of Butte and Silver Bow County** are in the process of designing several land application systems for their sewage effluent, have built stormwater detention ponds to retain nutrient-rich runoff from Butte Hill, and have diverted clean Silver Lake water downstream in summer.

The **Missoula County Health Department and Missoula Valley Water Quality District** are involved in several projects to reduce nutrient impacts to the Clark Fork River. The East Missoula Sewer project, which just passed a local bond election, is an important example. This project will connect 700 East Missoula homes to the Missoula Wastewater Plant, and will prevent the nitrates and other contaminants from East Missoula septic systems from leaking into the nearby Clark Fork River. Another project, the East Reserve Sewer Project, Phase II, is connecting 500 properties with septics and cesspools to the wastewater treatment plant.

An intensive monitoring program is underway to determine whether these efforts are effectively reducing nutrients and nuisance algae levels in the river. The first formal evaluation of the nutrient and algae trends in the river is scheduled for 2001.

Challenges in Attaining the VNRP Water Quality Targets

Although computer modeling indicates that the river's water quality can be restored by the proposed actions of the VNRP signatories, some major hurdles remain. Early analysis of the river's nutrient problems focused on soluble nutrients, where wastewater treatment plants are the dominant source. But the final VNRP water quality targets are expressed as total nitrogen and total phosphorus. In looking at total nutrients, non-point sources—-nutrient pollution related to land use--becomes a proportionally more important source.

An important question is posed by the additional nutrients coming in from new septic systems, new sewer hook-ups, and new stormwater runoff resulting from population growth. Ravalli County and Missoula County are two of Montana's fastest-growing counties. Missoula County has made ambitious commitments in the VNRP to hook-up thousands of septic systems to Missoula's modernizing wastewater treatment plant. Ravalli County is looking at ground water pollution issues, but has no program to protect surface waters from nutrients.

The small municipal and industrial wastewater treatment plants in the basin are another factor which could affect the VNRP's success. Several facilities have liberal nutrient load limits in their MPDES permits which would allow them to dramatically increase their nutrient discharge, and equal or exceed the nutrient load discharged by VNRP signatories.

In order to address these issues, the Tri-State Water Quality Council hired a VNRP Coordinator one year ago. This person is charged with the task of tackling agricultural non-point, septic-related non-point, and small point-source nutrient issues outside the scope of the original VNRP. The Coordinator has prioritized tributaries for agricultural non-point sources of nutrients and begun to raise project grant funds in coordination with Montana Fish Wildlife & Parks and the Natural Resources Conservation Service; begun an education effort on septic sources with county governments; and helped the Council develop policy recommendations to Montana DEQ on the management of MPDES permits in the basin.

Given the size of the basin and the complexity of the issues, it is still unclear whether the VNRP water quality targets will be attained within the ten-year time frame. Unless many other players—-counties, wastewater treatment plants, and agricultural interests--make voluntary nutrient management commitments, the State of Montana may face the choice of taking a stronger regulatory role or watching the success of the State's largest river TMDL be put at risk.

The Complementary Role of Other Projects

Many types of projects being promoted in the Basin could have a positive effect on nutrient pollution, even if that is not their principal objective. The VNRP is taking advantage of this situation, and looking for alliances with organizations doing other water quality work.

Stream restoration, riparian habitat, and grazing management programs implemented for fish and wildlife are prominent examples. Projects of this nature sponsored by conservation districts, wildlife agencies, or private groups can have a very positive effect on reducing non-point source nutrients discharged by streams. Yet, much room for improvement in coordination exists, as in many cases these projects are conceived, designed and implemented without any explicit consideration of nutrient impacts.

Wastewater treatment plant upgrades provide an excellent opportunity to improve nutrient management. The City of Hamilton, for example, has made great strides in reducing its phosphorus discharge to the Bitterroot River through a program of innovative upgrades made at their own initiative. Their work included investigating sources of phosphate coming in from their customers, and taking steps to voluntarily reduce that inflow load. In other cases, however, wastewater treatment plants are primarily focused on meeting other water quality parameters, and substantial money is spent without looking closely at nutrients, primarily because there is no state standard.

Projects funded by the Natural Resource Damage (NRD) Program have a tremendous potential to affect the excess nutrients dumped into the Clark Fork by damaged tributaries such as Silver Bow Creek, Mill-Willow, and Lost Creek. Restoration of wetlands, improved riparian habitat, and stablized streambanks in these tributaries could reduce the nutrients reaching the Clark Fork. On the other hand, nutrient monitoring underway or planned for these tributaries by VNRP could be an important part of impact monitoring for the NRD programs, as nutrient levels are often a good indicator of aquatic or riparian health.

It is unclear what effect Superfund's programs would have on nutrients, but stabilizing the mainstem's eroding banks, and restoring wetlands and riparian areas which can filter out nutrients from overland flow are certainly outcomes which would be positive from VNRP's perspective.

Scientific Issues Regarding Nutrients

Our knowledge of how nutrient pollution affects river ecosystems is relatively undeveloped—-most research on this topic has been on lakes. We need to better understand the effects of excess nutrients and algae on river ecology in our region, especially on the habitat and diversity of benthic invertebrates, and on the higher trophic levels which depend on them.

We need to better understand the diverse sources of nutrients and especially their transport from our agricultural and developing suburban areas to our rivers, including the dynamics of the subsurface route through shallow ground water to rivers.

The results of this and much more scientific work need to be translated into terms which the general public can understand, so that we can generate the interest and commitment to address nutrient pollution effectively.

Summary

The VNRP needs to make new alliances in the Clark Fork Basin, with small communities, rural and agricultural interests, fisheries interests, and other natural resource restoration programs if it is to achieve its ambitious goals. The VNRP also needs to encourage further research which will clarify the relationships between nutrients, algae, and aquatic habitat in rivers, and clarify the routes by which nutrients reach our surface waters. This is necessary to properly educate the public about this issue. And only an educated public will make the sacrifices necessary to reverse the degradation of our water quality and aquatic habitats.